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AVAILABILITY OF ADEQUATELY IODIZED SALT AT HOUSEHOLD LEVEL AND ASSOCIATED FACTORS IN RURAL COMMUNITY OF LAELAY MAYCHEW WOREDA, CENTRAL ZONE, TIGRAY, NORTH ETHIOPIA,2014

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LIST OF ACRONYMES AND ABREVATIONs

AOR- Adjusted Odds Ratio

CI- confidence interval

COR-Crude Odds Ratio

CSA - Statistical Agency of Ethiopia

DHS - Demographic and Health Survey

HH - Household

ICCIDD -International Conference on Control of Iodine Deficiency Disorders

IDD - Iodine Deficiency Disorders

LWHO- Laelay Maychew Woreda Health Office

PPM - Parts Per million

SPSS - Statistical Package for Social Sciences

UIE - Urinary Iodine Excretion

UNICEF - United Nation International Children and Education Fund

USI - Universal Salt Iodization

WHO - World Health Organization

Abstract

Background: Universal salt iodization is recommended as cost-effective, safe and sustainable strategy to ensure adequate intake of iodine by all populations. The coverage of universal salt iodization is still very low in Ethiopia. Therefore, identification of factors that influence the accessibility to iodized salt is essential to formulate a better policy and intervention measures.

Objective: The aim of the study was **to** assess availability of iodized salt and associated factors among households in rural community of Laelay Maychew Woreda, Central zone, Tigray, North Ethiopia.

Methods: Community based cross-sectional study was conducted from March 10 to April 10, 2014 by using face-to-face interview technique. Multistage sampling technique was used. The desired sample size was allocated proportional to sizes of population in each kebelle and systematic random sampling method was used to get study subjects. The collected data were entered, cleaned and analyzed using SPSS version 20 software. Bivariate logistic regression analysis was done to determine the significant relation between each independent variable with outcome variable. Multivariable logistic regression analyses were done to determine relative prediction level of independent variables to the outcome variable. Variable having $p < 0.05$ was considered as significant and AOR with 95% CI was used to interpret the result.

Results: One hundred ninety eight (33%) of the household respondents were used iodized salt adequately. Formal education [AOR=2.207, 95%CI [1.27-3.39], good knowledge about iodized salt and iodine deficiency disorders [AOR=2.11, 95%CI [1.37-3.25] and shorter storage of salt at household [AOR=1.61, 95%CI [1.10-2.35] were the identified factors that predict for availability of adequately iodized salt at household level.

Conclusion and recommendation: Availability of adequately iodized salt was very low in the study area. So, strengthening the current universal salt iodization program and further revising strategies to increase utilization of adequately iodized salt at household level is recommended. **Key words**: Availability, Iodized salt, Household, Ethiopia

1. INTRODUCTION

1.1 Statement of the problem

Iodine is a critical component of thyroid hormones which are produced by the thyroid gland. Thyroid hormones, and therefore iodine, are important for human life[1].
A deficiency of iodine leads to insufficient production of thyroid hormones, which have a wide range of negative consequences on various organ and muscle functions, particularly the heart, liver, kidneys and most devastatingly, the developing brain[1-3].

Iodine deficiency is a major health problem throughout the world and the greatest cause of preventable brain damage in childhood. This is the primary motivation behind the current worldwide initiatives to eliminate iodine deficiency through the strategy of universal salt iodization. The most overwhelming outcomes of iodine deficiency are increased perinatal mortality and mental retardation[4, 5].

Globally, it has been reported that 2.2 billion people (38% of the world's population) live in areas with iodine deficiency risk and its complications of which 350 million are in Africa [6, 7]. Iodine deficiency results in a loss of economic productivity and slows progress towards achievement of the Millennium Development Goals[8].
The recommended daily intake of iodine should be 90 mg for preschool children (0 to 59 months), 120 mg for schoolchildren (6 to 12 years), 150 mg for adults (above 12 years); and 200 mg for pregnant and lactating women[9].

Unlike nutrients (iron, calcium or the vitamins), iodine does not found naturally in particular foods; rather, it is present in the soil and is ingested through foods grown on that soil. Soils from mountains and from areas with frequent flooding are particularly likely to be iodine deficient and crops grown in these soil will be low in iodine concentration. Hence, external source is needed like iodized salt[1, 2].

The world health organization (WHO) and the United Nations children's fund (UNICEF) have recommended universal salt iodization (USI) as cost-effective, safe and sustainable strategy to ensure adequate intake of iodine by all populations. Worldwide

the proportion of people consuming iodized salt dramatically increased, from less than twenty per cent in the early nineties to about seventy per cent by 2000. But still 38 million newborns in developing countries every year remain unprotected from the lifelong effect of brain damage associated with iodine deficiency disorders (IDD)[4, 8].

A survey conducted in 2007 among 15 to 49 women signifies that Ethiopia is severely affected by iodine deficiency. About 6 million women in this age category were affected by total goiter. In this study, women with goitre and women living in highly goitre endemic areas were more likely to experience reproductive failure in the form of miscarriage and stillbirth than those living in less endemic regions or women without goitre [10].

In Tigray region out of 1796 reproductive age women examined for goiter 35.6% of them were affected by total goiter[10] and School-based cross-sectional study in adolescent girls the total goiter was 45.3%, only 16% of the households utilized adequately iodized salt and nearly 67% of the girls had biochemical evidence of iodine deficiency (UI levels < 100 µg/L)[11]

According to the demographic and health survey report of 2011, only around 15.4% of the Ethiopian population uses iodized salt. The percentage is higher in urban areas than in rural areas 23.2% compared with 13.3% respectively[12]. The reasons for such inadequate accessibility might be many and diverse. Therefore, identification of such factors that influence the accessibility to iodized salt is essential to formulate a better prevention policy and intervention measures.

1.2. Literature review

As the world's school children urinary iodine data showed that iodine deficiency is still a public health problem in several countries and the iodine intake of 36.5% world's children is in sufficient. These are 96 million in south –East Asia and 50 million in Africa and the western pacific. The highest proportion of iodine –deficient children are found in Europe (59.9%) and south –East Asia (39.9%) while the lowest are found in Americas (10.1%) and the Western Pacific (26.2%) [13].

1.2.1 Prevalence of Iodine deficiency and its disorders

Globally, the prevalence of goiter in the general population is 15.8% lowest in America (4.7%) highest in Africa (28.3%). Another comparison study of 2003 goiter prevalence showed that goiter prevalence had increased by 31.7% worldwide. All other regions experienced an increased in goiter prevalence from 18.5% in South- East Asia to 81.4% in Africa[13].

According to WHO analysis of 2003, it estimated that the WHO regions of the Americas and the western pacific had the lowest proportion of population with insufficient iodine intake (9.8% and 24% respectively). In the other WHO regions, the figure were Europe (56.9%), Eastern Mediterranean (54.1%), Africa (42.6) and south East Asia (39.8%)[14].

India bears a high burden of iodine deficiency disorders. According to survey conducted in union territories of three hundred twenty five districts 81% of the districts had endemic iodine deficiency with an estimated prevalence of over 71 million people with inadequate iodine intake. Every year over thirteen million infants are born unprotected from IDD[15].

A study done in Malaysia showed that the national prevalence of iodine deficiency disorders was 48.2%, higher in rural areas than in urban areas. The highest prevalence of urinary iodine less than100ug/L was noted as high as 81.4%.and 28.2% of the salt samples brought by the school children were found to have iodine content. but, the overall utilization of the households use adequately iodized salt was only 6.8%[16].

A study done in Sudan showed that Iodine deficiency disorder (IDD) constitutes a severe public health problem and more than two out of 10 school children age have goiter and the prevalence reaches 40% in some region of the country[17].

Study conducted among reproductive age groups in four regions of Ethiopia revealed that the total goiter rate was 35.8% that signify Ethiopia was severely affected by iodine deficiency. Sever iodine deficiency was significantly associated with reproductive failure and women with goiter and women living in highly endemic areas were more likely to experience reproductive failure in the form of miscarriage and still birth than those living in less endemic regions or women without goiter[10].

Similar study conducted in rural community of Sidama, Southern Ethiopia showed that the use of iodized salt was only two percent. Urinary iodine excretion for all participants was less than 49µg/L. The occurrence of goiter was eighty five percent in the women and thirty three percent in children and the median urinary iodine excretion (UIE) was 1µg/L for both mothers and children[18].

Another cross-sectional study conducted among rural children in Northwest Ethiopia revealed that the overall prevalence of goiter was found to be 37.6% and 29.7% of the samples had adequate iodine content[19].

1.2.2 Availability of adequately Iodized salt at household level

Universal salt iodization (USl) is a proven strategy to eliminate iodine deficiency and aims to make sure all edible salt is iodized because salt is an ideal vehicle for introducing iodine into people's diet. It is consumed by nearly everyone, in roughly equal amounts, throughout the year[20, 21].

Sixty eight percent of the world households have access to iodized salt. The western pacific and the Americas of the WHO regions have the greatest access to iodized salt and the least access for those residing in the Eastern Mediterranean and Europe. Iodine

supplementation previously was restricted to areas in which severe iodine deficiency is endemic and where there is no access to iodized salt[22].

In 2007, WHO estimated that nearly 2 billion individuals have an insufficient intake of iodine, including a third of all school-aged children. The highest prevalence of iodine deficiency is in Europe (52%), where the household coverage with iodized salt is the lowest (about 25%), and many of these countries have weak or non-existent control programmes for iodine-deficiency disorders. The lowest prevalence of iodine deficiency is in the Americas (10・6%), where the proportion of households consuming iodized salt is the highest in the world (about 90%)[1].

A study conducted in India over all, 71.1% of the households were using cooking salt which was iodized at the recommended level of 15 ppm or more. Only 9.3% of the households used salt that was not iodized at all and 19.3% used salt that was iodized inadequately (< 15 PPm). Around 83.25 of households in urban areas used salt with 15 ppm or more iodine content compared with 66.1 percent of households in rural areas[23].

Similarly another study conducted in North 24 parganas district of West Bengal India. Showed estimation of the iodine of the salt samples using spot iodine – testing kit revealed that 369 (72.9%) households were adequately iodized salt, and the remaining 137 (27. 1%) households were consuming inadequately iodized salt[24].

There has been steady progress iodine intake in Europe, the Eastern Mediterranean, Southeast Asia, and the western Pacific regions over the past 8 years, largely due to strengthened salt iodization programs and improved monitoring but there has been negligible overall progress in Africa[25].

Study conducted in South Africa on Iodine concentration in household salt showed that, adequately iodized salt were available in 62.4% households this study and the iodine concentration in salt was lower in rural areas than in urban and periurban areas[26].

Studies conducted in Uganda, Tanzania, Ghana, South Sudan, Somalia and North Sudan revealed that 96%, 83.3%, 75.6%, 72.9%, 6.7% and 0.6% of the households use adequate iodized salt respectively[27-30].

According to 2011 EDHS urban households are more likely to use iodized salt (23%) than rural households (13%). At the regional level Benishangul – Gumuz and Addis Ababa have the highest proportions of households using iodized salt (40% and 30%, respectively) whereas the Dire Dawa and Harari regions have the lowest (6%). Tigray region have also 22.3% households using iodized salt[12].

Studies conducted in Gondar town and Lay Armachiho, Northwest Ethiopia reveal that 28.9%, 29.7% of the household sampled salts respectively had adequate iodine content[19, 31].

A cross – sectional study was conducted in Northern Ethiopia on iodine concentration of salt samples from producers, retailers and consumers were determined using iodiometrc -titration. The concentration of iodine in the sampled salts decreased by 57% from the production site to the consumers and the Assessment of exposure showed that adults in 63% of the households, including 90% with pregnant women, were at risk of insufficient iodine intake[32].

1.2.3 Factors associated with availability of adequately iodized salt at household level

A study conducted in Toba Tek Singh, Pakistan revealed that out of ninety six, 91% housewives knew about iodized salt. Thirty six percent of the respondents were used iodized salt. Out of non users, 79% did not use it due to high cost, 11% due to change of taste and 06% due to the fear that it interferes with reproduction & its relation with diseases. Only 10% of illiterate and 44% of educated were using iodized salt. Similarly, utilization of iodized salt was increased as income increased [33].

Study done in Colombia showed that by using packaging with a good barrier like poly ethylene plastic package iodine losses can be significantly reduced for at least six

months otherwise salt iodized with iodate showed losses of 28% to 51% after three months, 35% to 52% after 6 months and up to 66% after 12 months[34] .

Study done in Viet Nam Women cited several explanations for not using iodized salt in response to open-ended questions. One was that they were familiar with un-iodized product and saw no motivation to change. Another was that they preferred using newly available herbal seasonings that were being promoted locally and contained no salt. A third reason given was that iodized salt made food taste bitter. In addition, many people in rural areas felt that food is “smoother” when prepared with cooking powder than when prepared with salt. Another reason was that iodized salt was not locally available for purchase. Lastly, many women replied not using iodized salt because they did not know that it was essential to use it. Iodized salt use was lower among nulliparous women, less educated women, factory workers or small-scale traders, government workers and women with common mental disorders at recruitment [35].

Study conducted in Haiti showed many potential barriers were identified to receiving adequate iodine intake and reducing IDD. Some of these include Household salt washing, Impurities in salt, salt packaging, Education, environmental, Legislation and unavailability of iodized salt. When asked specifically about the importance of iodine in the diet, many participants were able to state that deficiency would lead to goiter, and that it was important for health in children[36].

Another study conducted among Slum households of North-East Delhi, India revealed that consumption of adequately iodized salt was higher in households where the household head was literate and The various reasons reported by households consuming crystalline salt included low cost, since it tasted better and ‘feeling it is pure and uncontaminated unlike refined salt. Those households consuming refined salt, consumed it to save time and avoid the inconvenience of grinding crystalline salt, but opted for cheaper varieties owing to low purchasing power[37].Moreover, a study conducted in Ghana, Knowledge of iodized salt was quite high, as 72% of the respondents knew that not every salt contained iodine. In addition, 69.3% indicated that an inadequate intake of iodized salt can lead to the development of goiter. The main

reason given by exclusive users of common salt was that the price of iodized salt is slightly higher than that of common salt[28].

Study conducted in Canada found that iodine content in salt remain constant for many months when salt is packaged and kept dry, preferably in a cool place and away from strong light. In this study, high humidity resulted in rapid loss of iodine from iodized salt ranging from 30% to 98% of the original iodine content [38].

Another study conducted in Iraq revealed that packed salt was mostly adequately iodized compared with non packed salt[5].

Study conducted in South Africa on Iodine concentration in household salt samples identified why households use inadequately iodized salt. The most important factors were under-iodization, domestic use of non-iodized agricultural salt and poorly iodized coarse salt, and direct acquisition of salt from producers[26].

Household survey study conducted in Sudan showed that the great variation in consumption of iodized salt largely due to the availability of iodized salt in the markets[29].

According to EDHS 2011 Households in the highest wealth quintile are twice as likely to use iodized salt as households in the lowest wealth quintile[12].
Moreover, study conducted in Ethiopia showed that knowledge on IDD and use of iodated salt was assessed in the survey households. In All the general state except Addis Ababa more than 90% of the study women did not know the importance of iodized salt. Similarly apart few in Tigray and Addis Ababa, majority (>90%) had no understanding about the cause of iodine deficiency[10].

A study conducted in Shebe town, South West Ethiopia showed that. Female sex, literacy status and occupation were significantly associated with improper practice to iodized salt[39].

Study conducted in Sidama Zone, Southern Ethiopia showed that all women study participants reported that they had never consumed iodized salt, and never heard about iodized salt[40].

Similarly, Study conducted in Hawassa town, Southern Ethiopia found that more than half of the participants did not know the importance of iodized salt and no households were using adequately iodized salt and educational status of caretakers of the study participants was significantly associated with utilization of adequately iodized salt[41].

Another Study conducted in Gondar town Northwest Ethiopia revealed that using packed salt, not exposing salt to sunlight, shorter storage of salt at household and good knowledge of participants about iodized salt were associated with availability of adequately iodized salt at household level[31].

CONCEPTUAL FRAMEWORK MODIFIED FROM LITERATURES

Based on different relevant literature review, we came with this conceptual frame work which helps to developing questionnaire variables, to summarize the determinant factors and to analyze the association between dependent and independent variables.

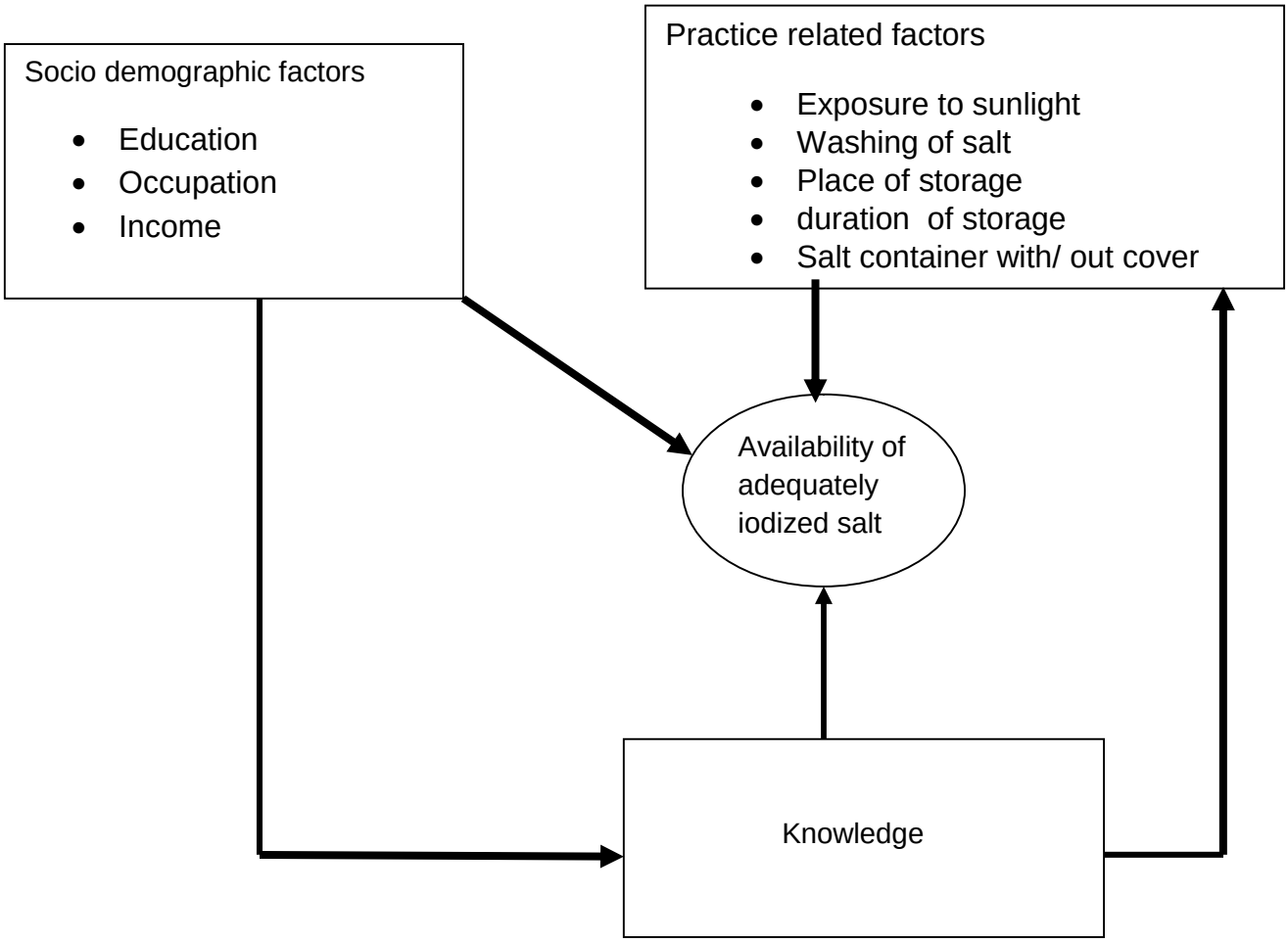


Figure 1: Conceptual framework for factors influencing availability of adequately iodized salt in households of Laelay Maychew woreda, Tigray, North Ethiopia, 2014.

1.3 Justification

According to world health organization, salt iodization needs to reach 90 percent if Ethiopia is to be on track to eliminate iodine deficiency disorders[42].

Hence, Ethiopia set an objective to increase the proportion of households that consume adequately iodized salt to be 90% by 2013 to achieve the goal of “Virtual Elimination of Iodine deficiency disorders by 2015” by means of universal salt iodization[43]. But the national coverage is still very low (15.4%)[12].

The reasons for such inadequate accessibility might be many and diverse, Therefore, Identification of such factors that influence the accessibility to iodized salt is essential to formulate a better prevention policy and intervention measures.

In addition, Information is lacking from the rural communities and in particular from the study area which shows availability of adequately iodized salt and its related factors. Therefore, this study will be crucial for policy makers to make informed decision.

2. Objectives

2.1. General objective

- To assess the availability of adequately iodized salt and associated factors among households in rural community of Laelay Maychew Woreda, Central zone, Tigray, North Ethiopia, 2014

2.2. Specific objectives

- To determine availability of adequately iodized salt at household level in the study area
- To identify factors associated with availability of adequately iodized salt in the study area

3. Methods and Materials

3.1 Study design

Community based cross-sectional study was conducted at Laelay Maychew Woreda, Central zone, Tigray, North Ethiopia to assess the availability of adequately iodized salt and associated factors among households in rural community

3.2 Study period

The data were collected from March10 to April 10, 2014.

3.3 Study area /setting

The study was carried out in randomly selected rural kebelles of Laelay May chew, Woreda, Central zone, Tigray, which is located at 1004km from the capital Addis Ababa and 248km from Mekelle the regional capital.

The current total population of Laelay Maychew woreda was 86,312 among this population, 43,790 were female and 42,432 were male with a total of 16039 households and 16 kebeles[44].

3.4. Source population

All households in rural community of Laelay Maychew Woreda were the source of population.

3.5. Study population

All households in the randomly selected kebelles of Laelay Maychew Woreda

3.6. Sampling unit

All systematically selected households in the randomly selected kebelles of Laelay Maychew woreda

Inclusion criteria

Households with female (≥ 18 years of age) who prepared food consumption for the entire household due to the fact that mostly females were engaged with food preparation in the rural communities. If two or more females were equally important to prepare food in the household the head of the household was selected otherwise lottery method was used.

Exclusion criteria

Those who were mentally ill, with physical disability like hearing, speaking and those who were seriously ill during data collection were excluded from the study.

3.6 Sample size and sampling procedure

The sample size was determined using a single proportion formula for specific objectives one, and double proportion formulas for specific objective two, using different proportions from previous findings by considering the following assumptions.

- ❖ **Single population proportion formula**
- ✓ Zα/2= Critical value at 95% confidence level of certainty (1.96)
- ✓ D= 2 (Design effect)
- ✓ d= 4% (Margin of error)
- ✓ Non-response rate 10%
- ❖ **Two proportion formula**
- ✓ Two sided confidence level (1-alph) = 95
- ✓ Power (% chance of detecting) = 80
- ✓ Ratio of control to case =1:1

Prevalence for specific objective one (prevalence of adequately iodized salt 13.3%[12] was substituted in single population proportion formula, and for specific objective two (prevalence of adequately iodized salt from households who have used packed iodized salt, p1=77.3%, and prevalence of adequately iodized salt from households who have used non-packed iodized salt, p2=18.7% [31] were substituted in double proportion formula. After calculated the sample size for each specific objectives becomes 554 and 28 respectively. Then the one with the highest sample size n=554 which was obtained at p= 13.3%% was taken i.e.

$$n = \frac{z^2\, p\,(1-p) \times D}{d^2} \qquad n = \frac{(1.96)^2(0.133)\,(0.867) \times 2}{(0.04)(0.04)} = 554$$

n = required sample size, p = prevalence of iodized salt utilization (13.3%), Z α/2 = critical value at 95% confidence interval which is equals to 1.96 (z value at alpha =0.05), d = Margin of error (0.04), D= Design effect=**2**

- After adding 10%(56) for non-response rate, the total sample size was n **= 610**

3.6.1 Sampling procedure

The study population was selected using multi-stage sampling technique. Two stage sampling was used to select the study participants. At the first stage by using simple random sampling 4 kebeles were selected from 16 total Kebeles.

At the second stage households was selected systematically after allocating the total sample to each of the selected kebeles proportionally. Systematic random sampling technique was used to select households. The sampling unit was households and every 8th household was taken for the study after selection of the first household using a lottery method based on the house numbers.

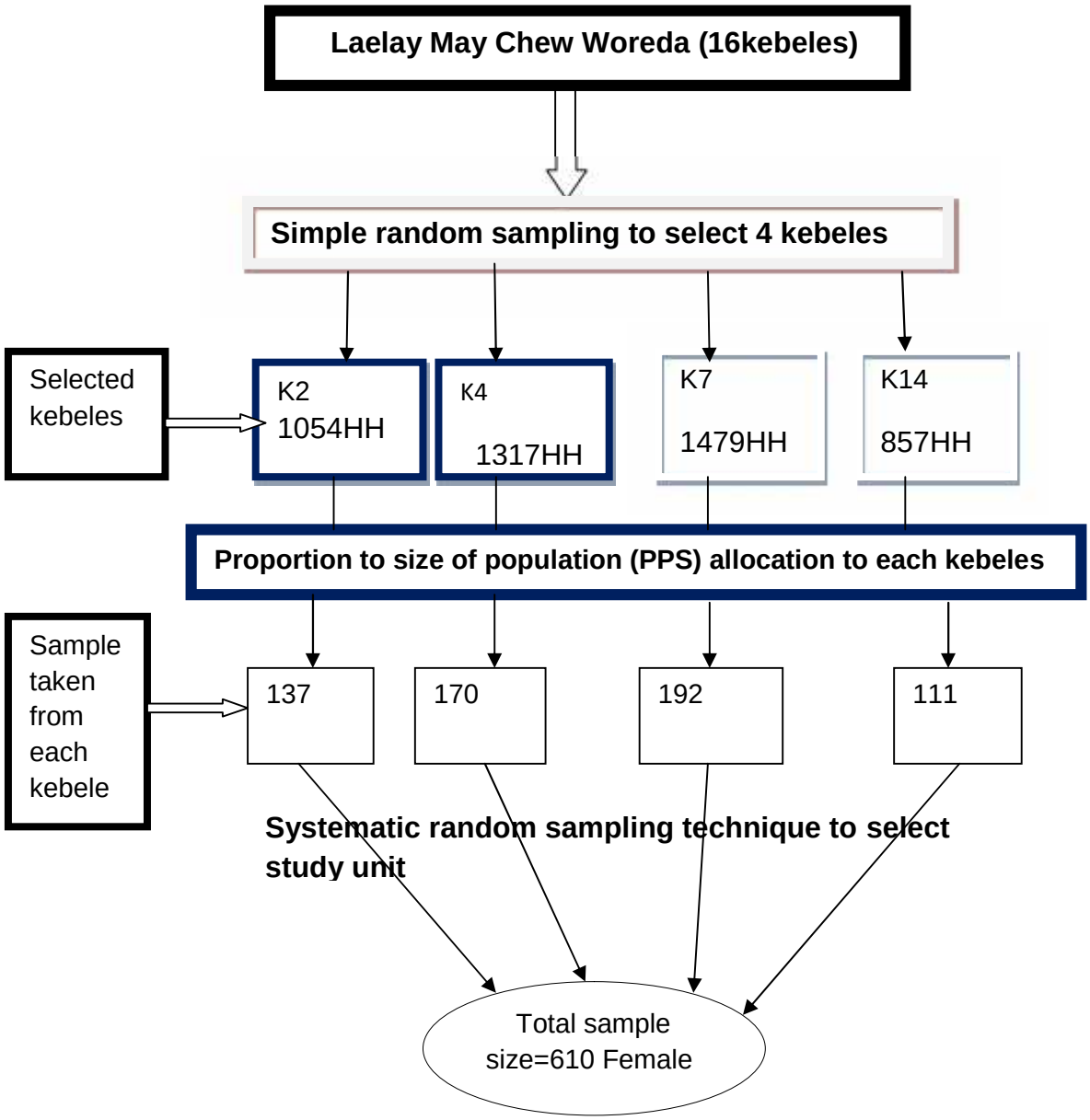


Figure 2: Schematic representation of sampling procedures for availability of adequately iodized salt and associated factors among households in rural community of Laelay Maychew Woreda, Central zone, Tigray, North Ethiopia, 2014.

Key: Mahbere selam(k2), Lesaliso (k4), Hatsebo (k7), Dura (k14)

3.8 Study variables

Dependent variables

Availability of adequately iodized salt (yes/ no)

Independent variables

Socio demographic and Economic factors: age, sex, religion, education, income marital status, ethnicity, occupation

Knowledge related factors: knowledge of IDD, knowledge of iodized salt, knowledge on handling of iodized salt

Practice related factors: exposed to sunlight, washing salt, time to add salt during cooking, handling and storage of iodized salt

Environmental factors: moisture, heat, sunlight, temperature

3.8.1 Operational Definitions

Availability of adequately iodized salt: Households' salt samples have ≥15ppm iodized salt when it is tested with rapid test kits [45]

Knowledge: Participants who scored points 50% and above regarding iodized salt and IDD knowledge questions were considered as good knowledge and participants who scored below points 50% considered as poor knowledge[31]

storage of iodized salt: When the participant store their salt for more than two months after purchased from the market was considered as longer storage and those who stored their salt for less than two months considered as shorter storage [34]

Practice – Respondents with any single practice that might result in the reduction of salt iodine content were labeled to have improper practice and those without such practices were labeled to have proper practices[39].

3.9 Data collection procedures

Data was collected using structured questionnaire via interviewing technique. The questionnaire was developed through a review of local and international literatures and was prepared originally in English and translated to Tigrigna local language and translates back to English in order to maintain consistency.

It contains socio demographic characteristics, knowledge, environmental factors, availability and accessibility of iodized salt. During the data collection sample salt used for cooking was obtained to test the iodine content using MBI KITS international salt test kits

For eight female diploma nurse data collectors and four Bsc nurse supervisors were given training for two days prior to the data collection on how to test the salt and how to interview.

IODINE TEST

Salt iodine testing is an important process indicator for monitoring progress towards USI. The newer MBI kits are inexpensive, require minimal training and provide quick results. Improved Iodized Salt Field Test Kits .It was used to test for the iodine content of various samples of salt collected from the selected households. The test Kit contains a small white cup, 2 test solution ampoules of 10ml, a recheck solution ampoule of 10ml and a color chart indicators for iodine content ranges of 0 ppm, less than 15 ppm and more than 15 ppm.

Procedures

i. Salt samples are collected into dry clean small white injection bottles.

ii. Fill small cup with salt, then spread the salt surface flat

iii. Shake well the test solution and then add two drops of the test solution on the surface of the salt by piercing the white ampoule with a pin and gently squeezing the ampoule.

iv. Compare the color on the salt with the color chart, within 1 minute and determine the iodine content

v. If no color appears salt (after 1 minute), on a fresh sample add up to 5 drops of the recheck solution in red ampoule and then 2 drops of test solution on the same spot. Now compare the color with color chart and determine the iodine content[46]

3.10. Data quality control and management

To ensure quality of data, 5%(31) of questionnaire was pre-tested before five days of the actual data collection in the non selected kebeles to ensure clarity, wordings and logical sequence of the questions with a household supposed to have similar socio-demographic characteristics with people of the study area in another similar setting.
and necessary correction was made based on the pre-test .During data collection, close Supervision was conducted by supervisors and principal investigator, by observing how the data collectors run the questions to the respondents and the collected data checked for the completeness, accuracy and clarity. This quality checking was done daily after data collection and correction was made before the next data collection measure. Quality of test kit was assured by observing for expiry date. Proper training of the data collectors and supervisors was assured by re demonstrating on how to test the sample salt individually. Data clean up and cross-checking was done before analysis.

After data collection, data were stored in a secured place to maintain confidentiality and backup of the data were stored in different areas not to lose the data. Each questionnaire was coded separately before analysis.

3.11 Data processing and Analysis

The collected data were coded, entered, cleaned and analyzed using SPSS for widows version 20. The descriptive statistic was computed to determine frequencies and percentages to present categorical data. Bivariate logistic regression was used to determine association between independent and dependant variables.

P-value< 0.2 in bivariate analysis was entered in to next multivariate analysis and Multivariable logistic regression analysis was done to determine relative prediction level

of independent variables to the outcome variable. Variable having $p < 0.05$ was considered as significant and AOR with 95% CI was used to interpret the result.

Before inclusion of predictors to multivariable logistic regression analysis, fulfillment of model assumption was checked. The goodness of model fitness was tested using Homers and lemeshow test at $p>0.05$ and result of the regression analysis provides an evidence for model adequacy well fit with the predictors ($P = 0.598$). Multicollinearity was checked using VIF<10/Tolerance tests>0.10 **(Annex IX).** Furthermore, the analysis provides Nagelkerke's R-square ($r^2 = 0.324$), to mean that the model explains 32.4% of the variation for the availability of adequately iodized salt in the households is explained by the selected explanatory variables. Finally, the results of the findings were presented by using text, graphs and tables.

3.12. Ethical consideration

Ethical clearance was obtained from institutional Review Board of institution of public health, collage of Medicine and Health Science, University of Gondar. Formal letter was obtained from Laelay Maychew woreda administration to get permission. The first page of the questionnaire was providing full information to the study participants regarding the purpose and nature of the research. In addition verbal informed consent was obtained from each study participant to confirm willingness for participation after explaining the objective of the study. Name, personal identifiers were not including in the study and in each household, permission was sought to run tests on samples of the salt used for cooking to determine their iodine levels. Participants' data were locked with a key/password to ensure confidentiality. Health education on the importance of iodized salt utilization, source of getting and how to they handle and use in their home was given through communicating with health extension workers for those who do not use iodized salt.

5. RESULTS

5.1. Socio-demographic characteristics

A total of 610 household female respondents were interviewed in the study and making a response rate of 98.4%.The mean (±SD) age of the respondents were 37.69(± 10.398) ranging from 18 to 72years. More than half, 311(51.8%) of mothers were in the age range 30-44 years.

Five hundred ninety eight (99.7%) of the respondents were Orthodox. The largest ethnic group was Tigray, 598(99.7%). Five hundred fifty one (91.8%) of the respondents were married and 535(89.3%) house wife by occupation. Concerning the educational status of respondents, 373(62.2%) of the respondents were unable to read and write. In addition, head of households were asked about their educational status, 265(44.5%) were unable to read and write. Three hundred thirty six (56%) of the households had family size ≤ 5 (**Table 1**).

Table 1: socio - demographic characteristics of household female respondents (n= 600) at rural communities of Laelay May Chew Woreda, Central Zone, Tigray, North Ethiopia, June, 2014

Variables	Categories	Frequency	Percent
age(n=600)	18-29	137	22.8
	30-44	311	51.8
	≥45	152	25.3
Religion(n=600)	Orthodox	598	99.7
	Muslim	2	0.3
Ethnicity(n=600)	Tigray	598	99.7
	Amhara	2	0.3
Marital status(n=600)	Married	551	91.8
	Single	12	2
	Divorced	6	1
	Widowed	31	5.2
Educational status(n=600)	Unable to read and write	373	62.2
	Able to read and write	62	10.3
	Primary(1-8)	135	22.5
	Secondary(9-12)and above	30	5
Occupational status(n=600)	House wife	535	89.3
	Other form of occupation	65	10.7
Household family size(n=600)	≤5	336	56
	>5	264	44
Wealth quintiles(n=600)	Poor	122	20.3
	Second	118	19.7
	Middle	120	20
	Fourth	121	20.2
	Richest	119	19.8

5.2. Availability of adequately iodized salt at household level

One hundred ninety eighty (33%) of the 600 tested salt samples of households have adequately iodized salt (≥ 15 ppm). Four hundred thirty six (72.7%) of the respondents were used common salt (coarse salt without plastic package) out of which 363(83.3%) were inadequately iodized. One hundred sixty four (27.3%) households used iodized packed- salt (with original salt packages), out of which 125(76.2%) were adequately iodized (figure-3).

The main reasons for not using iodized packet- salt were lack of awareness about the benefit of iodized salt 234(44.2%), being expensive compared with common salt 106(20%), it is difficult to find some times 137(25.8%), being less salty 5(0.9%), and others 48(9.1%) like not familiar to them and do not want to use. Those who had used iodized packet-salt, about 78(55.7%) have got from supper market. One hundred thirty six (97.1%) respondents indicated that they had been using iodized salt for less than five years where as only 4(2.9%) reported that they had used iodized salt for 6 years and above.

Only sixteen (2.7%) of household respondents exposed their salt to sun light. Five hundred fifty four (92.3%) of salt containers in the household had cover. Five hundred fifty one (91.8%) household respondents stored their salt in dry places. Three hundred ten (51.7%) household respondents were stored their salt for more than two months after purchasing, out of which only 79(25.5%) were adequately iodized. Two hundred ninety (48.3%) household respondents stored their salt for less than two months after purchasing, out of which 119(41%) were adequately iodized. Three hundred fifty eight (59.7%) had proper practice related to iodized salt, they usually add salt late at the end of cooking and after cooking while 242 (40.3%) add salt in the early beginning and in the middle of cooking which is improper practice (Table-2).

Table -2: Practice of household respondents regarding the use of iodized salt (n = 600) in rural communities of Laelay May Chew Woreda, Central zone, Tigray, North Ethiopia, June, 2014

Variables	Categories	Frequency	Percent
Type of salt	Iodized packet-salt	164	27.3
	Coarse salt (non-packed)	436	72.7
Sunlight exposure of salt	Yes	16	2.7
	No	584	97.3
Washing salt	Yes	19	3.2
	No	581	96.8
Salt storage place	Dry area	551	91.8
	Moist area	16	2.7
	Near to fire	33	5.5
Salt container	With cover	554	92.3
	Without cover	46	7.7
Duration of salt storage at household level	≤2 months	290	48.3
	>2 months	310	51.7
Time salt is added during food cooking	Early and at the middle of cooking	242	40.3
	Late at the end of cooking and after cooking	358	59.7
Distance traveled to get iodized salt	Less than 30minutes	49	29.9
	Greater than 30minutes	115	70.1

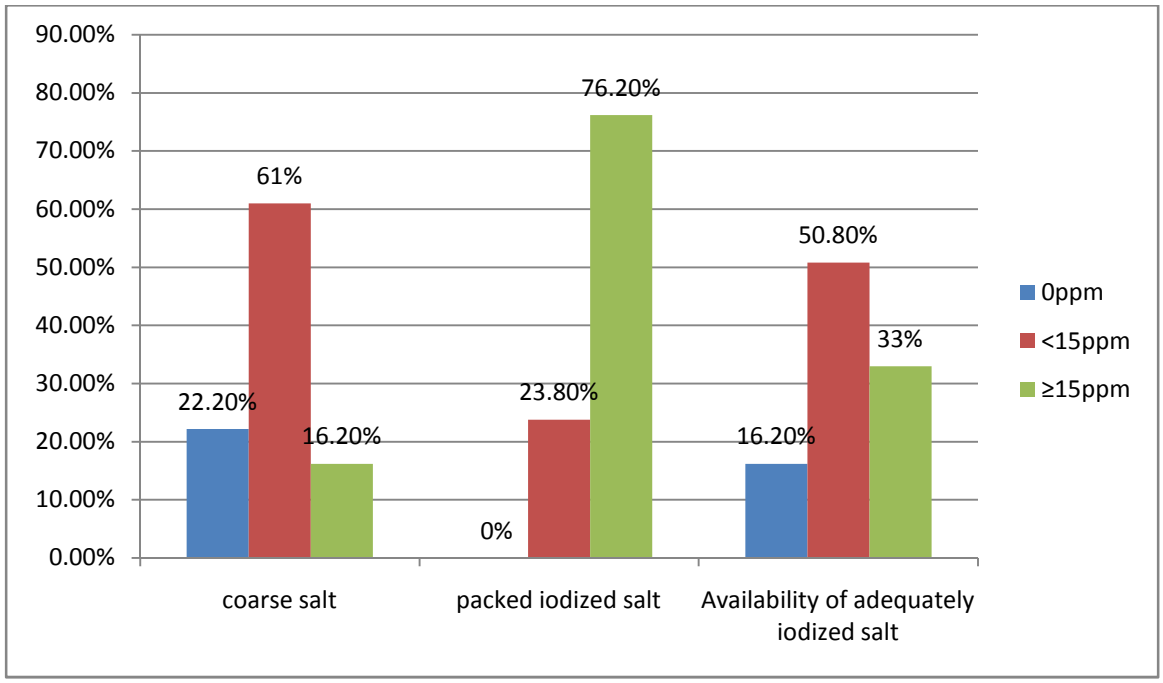
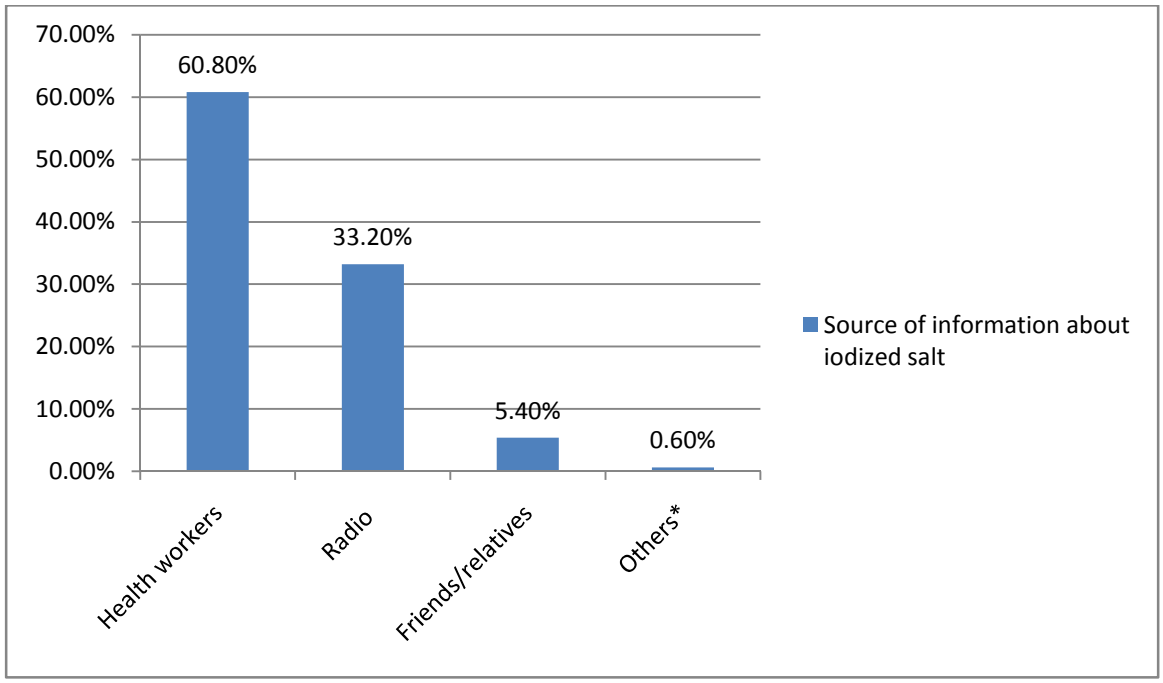


Figure -3: Availability of iodized salt and the type of salt using and its iodine content test result at household level in Laelay Maychew Woreda, Central zone, Tigray, North Ethiopia, 2014(n=600)

Regarding knowledge about iodized salt and IDD 215 (35.8%) of the household respondents had good knowledge on iodized salt and IDD. Four hundred sixty three (77.2%) of the household respondents had heard about iodized salt. The most frequently mentioned sources of information on iodized salt were 392(60.8%) health workers (figure-4). Three hundred twenty eight (47.2%) of the participants reported that iodized salt is important to prevents goiter. Two hundred thirty seven (39.5%) household respondents did not know the effects of iodine deficiency. One hundred eighty one (30.2%) of the household respondents said that every salt contain iodine. Household respondents were also asked about the taste of iodized salt, 277(46.2%) of respondents replied that the taste of iodized salt is different from that of common salt. Concerning storage of iodized salt, 129(21.5%), and 137(22.8%) of the respondents did not know that iodine is volatile when it is stored in un-enclosed container and near to fire respectively.



*** Books, Students and school**

Figure 4: Source of information about iodized salt in Laelay Maychew Woreda, Central zone, Tigray, North Ethiopia, 2014(n=600)

5.3. Factors associated with availability of adequately iodized salt at household level

Being young age, formal education, knowledge about iodized salt and IDD, shorter duration of storage, place of storage, having radio and salt container with cover were the factors associated with availability of adequately iodized salt in the bivariate logistic regression analysis. However, The multivariable logistic regression analyses revealed that, those who have formal education were 2.07 times more likely to have adequately iodized salt than those who have no formal education [AOR=2.07, 95% CI [1.27-3.39], those who had good knowledge about iodized salt were 2.11 times more likely to have adequately iodized salt than those who have poor knowledge [AOR=2.11, 95% CI [1.37-3.25] and those who store salt for less than two months at household level were 1.61 times more likely to use adequately iodized salt than those who store salt for more than two months [AOR=1.61, 95% CI [1.10-2.35] (Table -3).

Table-3: Factors associated with availability of adequately iodized salt at household level by selected variables (n = 600), in rural communities of Laelay May Chew Woreda, Central zone, Tigray, North Ethiopia, June, 2014

Variables	Categories	Availability of iodized salt at household level		Crude OR (95% CI)	Adjusted OR (95% CI)
		≥15ppm	<15ppm		
Age	18-29	77	60	4.29[2.59-7.12]	1.80[0.99- 3.23]
	30-44	86	225	1.28[0.81-2.01]	0.83[0.50-1.36]
	≥45	35	117	1	
education	No formal education	108	327	1	
	Formal education	90	75	3.63[2.495-5.291]**	2.07[1.27-3.39]**
knowledge	Good knowledge	111	104	3.66[2.55-5.23]**	2.11 [1.37-3.25]**
	Poor knowledge	87	298	1	
Salt Container	with cover	189	365	2.13[1.01-4.50]	1.23[0.55-2.78]
	no cover	9	37	1	
Place of Storage	dry area	189	362	2.32[1.10-4.88]	1.76[0.79-3.93]
	moist & heat area	9	40	1	
Radio	Yes	100	150	1.71[1.22-2.42]	1.17[0.76-1.80]
	No	98	252	1	
Duration of storage	≤2 months	91	159	2.04[1.44-2.88]**	1.61[1.10-2.35]**
	>2 months	61	289	1	

P-value is significant at α < 0.05. **OR- odds ratio

6. Discussion

The result of this study showed that 33 %(95%, CI = 29.2 – 36.7) of households have adequately iodized salt. This availability of iodized salt is far lower than the WHO's recommendations that more than 90% of households should utilize adequately iodized salt to eliminate iodine deficiency disorders [42]. This finding was agreement with the finding from Armachiho district, Northwest Ethiopia(29.7%)[19] .

This finding was higher than a study conducted in Gondar town, Northwest Ethiopia(28.9%)[31], Tigray region in the EDHS report of 2011(22.3%) and the EDHS 2011 report; the national coverage of iodized salt in rural households of Ethiopia (13.3%)[12]. The high rate of availability of adequately iodized salt at household level in the current study might be because of the ministry of health in the last few years have been made more effective strategy at production, distribution and retailer level to enhance universal salt iodization program.

This study was not in agreement with the study conducted in Hawassa town, Southern Ethiopia[41] which showed that no households were using adequately iodized salt.

This study was lower than a study conducted in South Africa, Uganda, Ghana and South Sudan revealed that 62.4%, 96%, 75.6% and 72.9% of the households use adequately iodized salt respectively[26-29]. This finding was also lower than the findings from West Bengal (72.9%)[24] and Belgaum District**,** India(50%)[47]. This difference might be due to the availability and accessibility of iodized salt in the market, legislation and laws to fortify salt with iodine and handling practices of iodized salt. But this result was higher than a study conducted in Somalia (7.7%)[30]. This might be due to the fact that iodine intake in Somalia is among the highest in the world and excessive according to WHO criteria associated with household drinking water[30], so emphasis might not given to universal salt iodization in Somalia.

In this study the most frequently mentioned sources of information on iodized salt were 392(60.8%) health workers. This result was not consistent with a study conducted in Ghana and Gondar town that mentioned radio and television were the main source of information respectively[28, 31].

This might be due to the current house-to- house educational strategy through the health extension workers more deployed in the rural communities of Ethiopia. This study also showed that health workers are not the only source of information about iodized salt in the rural communities. Radio (33.2%) also presents a major opportunity for delivering messages that can be tailored to promote the elimination of iodine deficiency disorders through utilization of iodized salt.

Two hundred seventy seven (46.2%) of respondents replied that the taste of iodized salt is different from that of common salt similar study conducted in Ghana[28]that more than half of the study participants indicated that the taste of iodized salt was not the same as that of common salt. However, in a double-blind study conducted in Mongolia[48] using the same respondents revealed that they could not distinguish the taste differences between iodized and non-iodized salt. This may be due to psychological perception that as if the iodized salt is different from that of common salt.

As to the factors associated with availability of adequately iodized salt, the binary logistic regression model showed that higher educational status, good knowledge about iodized salt and IDD and shorter duration of salt storage at home were closely associated factors.

Higher educational status of household respondents was significantly associated with adequate availability of iodized salt. This finding was similar with a study conducted in Singh city, Pakistan, 2008 (p=0.002)[33] where only 10% of illiterate as compared to 44% of educated ones where having iodized salt. Similarly, findings from Basra city, Iraq, 2012(p=0.01)[5] revealed more household members with university education had iodized salt in the household than those who were illiterate or only could read/write. This might be due to the fact that education may increase awareness about iodized salt

and its health benefit. So, education is the main pathway of communication for any massage to alleviate iodine deficiency disorders by means of universal salt iodization.

Knowledge of household respondents about iodized salt and IDD was significantly associated with availability of adequately iodized salt. This result was similar with the finding from Bia district, Ghana[28] and Gondar town, Ethiopia[31] where knowledge about iodized salt and its benefit identified as predictor variable for adequate availability of iodized salt. This might be due to the fact that those who have good knowledge about iodized salt and its health benefits most likely used iodized salt. But finding in Hawassa town, Ethiopia, 2009[41] knowledge was not significantly associated with use of adequately iodized salt after controlling for educational status. This might be due to confounding effect.

Duration of storage at household level was significantly associated with availability of adequately iodized salt. This finding was consistent with study done in Gondar town, Ethiopia[31]. Supporting our finding, study done in Canada[34] showed that salt iodized with iodate losses of 28% to 51% after three months, 35% to 52% after 6 months and up to 66% after 12 months and high humidity resulted in rapid loss of iodine from iodized salt ranging from 30% to 98% of the original iodine content. Likewise, an experimental study done in London[49] showed that the loss of iodine was 24%-90% during the storage of 63 weeks when exposed to different environmental factors but the loss of iodine was only 5.6%% after 13 months' of storage, where salt was stored in a glass jar. This might be due to fact that Iodine is easily volatile when exposed to different environmental conditions like heat, humidity, moisture and light during storage and distribution.

6.1. Strength of the study

- Being community based approach.

6.2. Limitation of the study

- Did not include titration method to determine concentration of iodine in the salt
- Did not include urinary iodine concentration to determine body iodine level

7. Conclusion

- This study revealed that availability of adequately iodized salt at house level was very low.
- Misconception about iodized salt was observed in this study that the taste of iodized salt is different from that of common salt
- Availability of adequately iodized salt at household level was associated with formal education, good knowledge about iodized salt and iodine deficiency disorders and shorter storage of salt at household.

8. Recommendations

1. To policy makers

    - ❖ Nutrition educational program with specific interventions are recommended to increase knowledge of consumers on iodized salt.
    - ❖ The existing laws and policies on universal salt iodization and quality assurance of iodized salt from the production stage to the selling stage should be enforced. .
    - ❖ Mass media should actively take part in educating people on importance of iodized salt and its storage and the usage for IDD prevention.

2. To producers and distributers

    - ❖ The distribution network should be streamlined so as to reduce the time interval between iodization and consumption levels
    - ❖ Salt used for consumption recommend to be iodized and packed

3. To Laelay Maychew Woreda Health Office and Health workers

    - ❖ Routine testing for iodine levels in salt sold in the markets and used by households should be done to assist salt distributors to form associations and to facilitate the monitoring of salt sold in markets
    - ❖ Dissemination of information regarding proper storage and handling of iodized salt is necessary to address loss of iodine from salt.
    - ❖ Education campaigns should target the less educated since they are the ones with the most limited availability of adequately iodized salt.
    - ❖ It also suggests that, health education program which seek to promote the consumption of iodized salt should aim at targeting women groups and organizations at the community level.
    - ❖ Health workers at the community level should educate people on the importance of iodized salt.
    - ❖ Great efforts are necessary to correct the misconception that the taste of iodized salt is different from that of common salt through dissemination of information, communication and education massages.

- ❖ Households should be instructed about the duration of salt storage not to keep for more than two months at home.

4. To communities

- ❖ Increasing involvement by community leaders in nutrition education by incorporating universal salt iodization into the current efforts like Women developmental army and networks(one-to-five) as main issue

5. Recommendation for Researchers:

- ❖ Further study should be done in other parameters to determine the full iodine status of the population.

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10. ANNEXES

Annex I: Consent form in English language

Institute of Public Health Department of Applied Human Nutrition, collage of Medicine and Health Science, University of Gondar study questionnaire on the utilization of iodized salt and associated factors among households in rural community of Laelay Maychew Woreda, central zone Tigray, Ethiopia, 2014

Dear madam/sir good morning /good afternoon

My name is _____I am working as data collector in research project, which is conducted by University of Gondar. We are interviewing adult female individuals who can prepare food for the entire household about their utilization of iodized salt and associated factors with it. I am going to ask you some questions that are not difficult to answer. Your name will not be written in this form and will never be used connection with any information you tell us. All information give by you kept confidential. Your participation is voluntary and you are not obligate to answer any question which you do not wish to answer. If fill discomfort with this, please fill free to drop it any time you want .This will be take about 15-20 minutes. Could I have your permission to continue?

1. Yes, (if say yes thanks and continue with her)
2. No, (if say no thanks and skip her)

Annex II: Information sheet in English language

Title of the Research Project: Household Utilization of iodized salt and associated factors among households in rural community of Laelay Maychew Woreda, central zone Tigray, Ethiopia, 2014

Name of Principal Investigator: Berihu Gidey

Name of the Organization: University of Gondar, Gondar College of Medicine and Health Sciences, institute of Public Health Dpartment of Applied Human Nnutrition

Information sheet and consent form prepared for persons who are going to participate in this research project.

Introduction

This information sheet and consent form is prepared with the aim of assessing the Utilization of iodized salt and associated factors. The research group includes the principal investigator, eight trained data collectors, three Supervisors, and two advisors from University of Gondar.

Purpose of the Research Project

The aim of this study is to assess the utilization of iodized salt and associated factors which intended to assess factors that influence the accessibility to iodized salt which are essential to formulate a better prevention policy and intervention measures. The results of this study will be used to design appropriate intervention programs to address the low utilization of iodized salt.

Procedure

This study involves all female adult population who can prepare food for the entire household. You are randomly selected to be one of the study participants if you are willing to take part in this study and we kindly invite you to take part in our project. If you are willing to participate, we are so happy and we need you to clearly understand the aim of this study and to sign the consent form. Finally you are kindly requested to give your genuine response in the interview questionnaire. you do not need to tell your name to the data collector and all your responses and the results obtained will be kept confidentially by using coding system whereby no one will have access to your responses

Benefits, Risk and /or Discomfort

By participating in this research project you may feel some discomfort in wasting your time (a maximum of 20minutes) .However, your participation is definitely important to the level of iodized salt utilization and its associated factors so as to design appropriate prevention strategy to enhance universal salt iodization.

There is no risk or direct benefit in participating in this research project.

Incentives/Payments for Participating

You will not be provided any incentives or payment to take part in this project.

Confidentiality

The information collected from you will be kept confidential and stored in a file, without your name by assigning a code number to it. And it will not be revealed to any one except the principal investigator and will be kept locked with key

Right to Refusal or Withdraw

You have the full right to refuse from participating in this research. You have also the full right to withdraw from this study at any time you wish.

Person to contact

This research project will be reviewed and approved by the ethical committee of the University of Gondar. If you have any question you can contact any of the following individuals and you may ask at any time you want.

a) Name: Berihu Gidey
   Telephone: +2519 23492776
   E-mail: berihu.gidey@gmail.com

b) Mr. Kassahun Alemu (MPH, PHD candidate) Tel 251911752466

c) Mrs Azeb Atnafu (MPH) Tel 251918774536

ANNEX III. ASSENT FORM

I have been informed that the purpose of this study is to assess availability of iodized salt and associated factors at household level. I have understood that participation in this study is entirely voluntarily. I have been told that my answers to the questions will not be given to anyone else and no reports of this study ever identify me in any way. I have also been informed that my participation or non-participation or my refusal to answer questions will have no effect on me. I understood that participation in this study does not involve risks

Respondent's signature_____

If no, skip to the next participant

Date of interview: _____ Time started: _____ Time finished: _____

Interviewer

Name_____Signature_____Date_____

Supervisor's name _____ signature _____

Annex IV: English Version Questionnaire

Questionnaire for availability of adequately iodized salt and associated factors among households in Laelay Maychew Woreda, central zone, Tigray, Ethiopia, 2014

Kebele_____ Interview No_____

s/no	Questions	Responses	Skip Responses
1	Socio- demographic characteristics		
101	your age	----------year	
102	What is your Religion?	1. Orthodox 2. Muslim 99.Others/specify_____	
103	What is your Ethnicity?	1. Tigray 2. Amhara 99. Others/specify_____	
104	What is your Marital status?	1. Married 2. Single 3. Divorced 4. widowed 5. Separated 6. others/specify_____	
105	What is your Educational status?	1. Can't read and write 2. Able to read and write 3. primary(1-8 grade) 4. Secondary(9-12) 5. Diploma and higher	
106	What is the educational status of the head of the household?	1. Can't read and write 2. Able to read and write 3. primary(1-8 grade)	

		4. Secondary(9-12) 5. Diploma and higher	
107	What is Your Current occupational status?	1. Housewife 2. Farmer 3. Government employee 4. Daily laborer 5. Others/Specify_____	
108	Family size	_____in number	
109	Does your household have: a. A radio? b. A mobile telephone? c. A bed with sponge/ mattress? d. Own house e. Chair f. Table	 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No 1. Yes 2. No	
110	Does your household Own: a. Milk cows b. Oxen? c. Goats? d. Sheep? e. Donkey? f. Beehives? g. Chickens?	 1. Yes ____ 2. No 1. Yes ____ 2. No 1. Yes____ 2. No 1. Yes____ 2. No 1. Yes ____ 2. No 1. Yes ____ 2. No 1. Yes____ 2. No	
111	Dose any member of this household own	1. bicycle 2. motor cycle 3. animal drown cart 4. car/truck 99.others_____	

112	Main material of the floor(observation)	1. earth/sand 2. dung/mud 3. cement 99 others_____	
113	Main material of the roof (observation)	1. corrugated iron 2. thatch/leaf/mud 4. cement 99 others_____	
114	Main material of the exterior wall	1. Stone with mud 2. Wood with mud 3. Cement 99. Others_____	
115	How many rooms in this household are used for sleeping?	_____in number	
116	Where is the cooking usually done?	1. In separate building 2. out doors 3. In the house 99. others specify _____	
117	Do you have any toilet facility	1. Yes_____ 2. No	
118	Does any member of this household own any agricultural land?	1. Yes 2. No	
119	Does any member of this household have a bank or microfinance saving account?	1. Yes---------- 2. No	

Part two: Knowledge of household female respondents about iodized salt at household level

201	Have you ever heard about iodine deficiency before?	1. yes 2. no	If no go to Q 204
202	Do you know the consequence of iodine deficiency?	1.yes 2. no	If no go to Q 204
203	If q202 yes, what are the consequences?(multiple response is possible)	1. Goiter 2. Mental retardation 3. Growth retardation 3. Still birth/abortion 4. loss of learning ability 99. Others/specify_____	
204	Have you ever heard about iodized salt before?	1. yes 2. no	If no go to Q 301
205	If q204 is yes, Where do you get this information?	1. Health workers 2. Radio 3. Friends 99. Others/specify____	
206	If q204 is yes, why intake of iodized salt is important? (Multiple answer is possible)	1. to prevent goiter 2. to remain healthy 3. to prevent iodine-deficiency disorders 4.to grow well 5. I do not know 99. others	
207	Do you know any consequence if not	1. Yes 2. No	If no go to Q 209

	using iodized salt?		
208	If q207 is yes, what is the consequence of not using iodized salt?	1. Goiter 2. Mental retardation 3. Growth retardation 4. Stunted growth in children 5. I don't know 99. Others/ specify	
209	Is every salt containing iodine	1. Yes 2. No	
210	Do know iodized salt have the level of iodine and expiry date in their container?	1. Yes 2. No	
211	Is iodized salt need more care than non iodized salt?	1. Yes 2. No	If no go to Q 213
212	If q211 is yes, what type of care needed?	1. far from heat and faire 2. prevent from moisture 3. prevent from sunlight 99. Others specify_____	
213	Is iodized salt loss its content if kept near heat?	1. Yes 2. No	
215	Can iodine content reduce when iodized salt is not stored in enclosed container?	1. Yes 2. No	
216	Is the taste of iodized salt different from that of common salt	1. Yes 2. No	

Part three: Practices of household respondents in handling iodized salt at household level			
301	Which type of salt are you using currently for your food?	1. Iodized(packed) salt 2. coarse salt(under-iodized salt) 3. rock salt	If they used iodized(packed) salt answer Q 303- 312
302	What are the reasons for not using iodized salt?	1. expensive 2. is too salty 3. not salty 4. Difficult to find 5. is too bitter 6.lack of awareness 99. others specify_____	For those who are not using iodized salt
303	For how long use iodized salt in your home?	1. _____ in years 2. I do not remember	
304	From where did you get the iodized salt?	1. village shop 2. Super market 3. market 4. Others specify_____	
305	How much distance travel to get iodized salt?(single travel)	_____in minute	
306	Do you use cover for your salt container in the home?	1. Yes 2. No	
307	Do you expose your salt to sunlight?	1. Yes 2. No	

308	Do you wash your salt to remove impurities from the salt?	1. Yes 2. No	
309	Where is the salt storage place?	1. Dry area 2. Moist area 3. Nearest the fire 99. Others specify_____	
310	For how long use the iodized salt after you purchase from the market?	_____in months	
311	At what time you added iodized salt during cooking of food?	1. Early during cooking 2. At the middle of cooking 3. late at the end of cooking 4. After cooking	
Part four: observational data			
401	The iodine content of salt will determined qualitatively using a spot testing kit to show the prevalence of USI Iodine content test result	1. 0 ppm 2. <15 ppm 3. ≥15ppm	

Thank you very much for your cooperation!!!

ANNEX V: መብርሂ ቅድመ መሕትት

ጎንደር ዩንቨርስቲ ኮሌጅ ሕክምናን ጥዕና ሳይንስን ክፍሊ ትምህርቲ ስነ-ምግቢ ወድ ሰብ

መፅናዕቲ ተጠቃማይ አዮዲን ዘለዎ ጨውን ተዛመድቲ ጉዳያትን አብ ላዕላይ ማይ ጨው ወረዳ

ሰላም- ከመይ ውዒለን/ኩም

አነ ሽመይ----------ይባሃል። ኣብዚ ዕለት እዚ ኣብዚ ዝተረከብኩሉ ምክንያት ኣብ ተጠቃማይነት አዮዲን ዘለዎ ጨውን ተዛመድቲ ጉዳያትን ሐበሬታ ንምእካብ እዩ። ፅንዓቱ ዝካየድ ብኣቶ በሪሁ ግደይ እንትኸውን ኣብ ጎንደር ዩንቨርስቲ ስነ-ምግቢ ክፍሊ ትምህርቲ ናይ ካልኣይ ዲግሪ ተምሃራይ እዩ።

ዕላማ ናይዚ መፅናዕቲ ኣብ ላዕላይ ማይ ጨዉ ወረዳ ዝርከባ ገዛዉቲ ተጠቃማይ አዮዲን ዘለዎ ጨውን ተዛመድቲ ጉዳያትን ንምፍታሽ እዩ። ኣብዚ መፅናዕቲ ንክትሳተፉ/ፉን ትክክለኛ ሐበሬታ ክትህባ/ቡን ብትሕትና ይሐትት። ናትክን/ኩም ምትሕብባርን ድሌትን ኣብዚ ዝግበር መፅናዕቲ ኣብ ተጠቃማይ አዮዲን ዘለዎ ጨውን ተዛመድቲ ጉዳያትን ዘለዉ ፀገማት ንምፍላይ ኣዝዩ ጠቃሚ እዩ። እዚ መፅናዕቲ ብቃለ መሕትት ዝካየድ ኮይኑ ንኣስታት 15 -20ደቒቓ ግዜክን/ኩም መስዋእቲ ንክትገብራ/ሩለይ ይላቦ።

እዚ መጠይቅ ዝምላእ ብዝሰልጠነ ሐታታይ ክከውን ከሎ ኣብ ኩሉ ክይዲ ምምላእን ሐበሬታታት ምስጢሩ ዝተሐለወ ምኻኑ ከረጋግፅ ይፈቱ። ናይ ውልቀ ሰባት መልሲ ዝተሓዝ ብዝወሃብ ኮድ ቁፅሪ ክኸውን ከሎ ናይ ውልቀ ሰብ ሽም ይኹን አድራሻ አይተሐዝን። ውፅኢት እውን ዝግለፅ ብጥቅሉል እምበር ናይ ውልቀ ሰባት ዝግለፅ አይኮነን።

እዚ ቃለ መሕትት ብድሌት ጥራሕ ዝግበር እዩ። ስለዚ ኣብዚ ሕቶን መልስን ብምስታፍክን/ኩም ኮነ ብዘይምስታፍክን/ኩም ኣብ ቀፃሊ ንባዕልክን/ኩም ይኹን ኣብ ስድራክን ኣብ ዘድልየክን/ኩም ኣገልግሎት ዝፈጥሮ ምንም ዓይነት ፅዕንቶ ከምዘየለ የረጋግፅ። ኣብ ዝቀርብ ሕቶ ጥርጣረ እንተሓዲሩወን/ኩም ኣብ ዝኮነ እዋን ናይ ምቁራፅ መሰለን/ኩም ዝተሐለወ እዩ። ነዚ መፅናዕቲ ዝምልከት ሕቶ እንተለወን ወይ ድማ ናይዚ መፅናዕቲ ውፅኢት ክፈልጣ እንተደልየን ከይተሰከፋ/ፉ ንበዓል ዋና እዚ መፅናዕቲ ብዝስዕብ ኣድራሻ ምጥያቕ ይክእላ/ሉ እየን/ዮም።

ኣድራሻ በዓል ዋና መፅናዕቲ

በሪሁ ግደይ ቁፅሪ ሞባይል- 251 923 492776, ኢ. መይል: **berihu.gidey@gmail.com**

1. እወ---------- ናብ ዝቅፅል ገፅ ቀፅል/ሊ

2. አይፋለይን----------ናብ ዝቅፅል ተሳታፋይ ቀፅል/ሊ

ANNEX VI: **ሰነድ ብዛዕባ ሓበሬታ መፅናዕቲን መሕተቲ ስምምዕነትን**

መጠንን ፅንዓትን መናእሰይ አብ ድንግልና ዝምልከት ዘለዎሞ አመላካክታን ወሰንቲ ምክንያታትን ነበርቲ ከተማ መቀለ ንምፅናዕ ዝተዳለወ ሰነድ ሓበሬታ፡፡

ዋና ፅንዓት መካየዲ፡ በሪሁ ግደይ

ሽም ትካል፡ ጎንደር ዩንቨርስቲ ፤ጎንደር ሕክምናን ጥዕና ሳይንስን ኮሌጅ፤ሓለዋ ጥዕና ሕብረተሰብ ክፍሊ ትምህርቲ ስነ-ምግቢ ወድ ሰብ

ወፃኢ ዝሸፍን ትካል፡ ጎንደር ዩንቨርስቲ

መእተዊ፡ እዚ ሓበሬታንመሕተትን ስምምዕነት ሰነድ ንምስታፍ ንሓተሉ መብራህርሂ ሰነድ እዩ፡፡ንምስታፍ ቅድሚ ምውሳነን በቶም ሓበሬታ አከብቲ ሰነድ ይንበብ፡፡ ብፅሞና ብምድማፅ ዘይተረደአን ወይ ግልፂ ዘይኮነ ነገር ቅድሚ ስምምዕነት ተሳትፎ ምጅማር ምሕታት ይካአል እዩ፡፡ ከምኡ ውን ምስታፍ ምስ ጀመራ ግልፂ ዘይኮነ አብ ዝኮነ ግዚ ምሕታት ይካአል እዩ፡፡

ዕላማ መፅናዕቲ፡ ናይዚ መፅናዕቲ ዋና ዕላማ ፅንዓት ተጠቃምነት አዮዲን ዘለዎ ጨው አብ ብርኪ አባይቲን ወሰንቲ ምክንያታትን ንምፅናዕ እንትከውን ዝተፈላለዩ መፍትሒ እቲ ፀገም ንምንፃር ዓብይ እጃም አለዎ፡፡ብተወሳኪ ብዝሐሸ መንገዲ ንምፅናዕ አንፈት ንምምልካት ይሕግዝ፡፡ስለዚ ተሳተፍቲ እዚ መፅናዕቲ ንክትኮና ተዓዲመን አለዋ ፡፡ ዕላማ መፅናዕቲ ብምርዳእ ንምስታፍ እንተተሰማሚዐን፤ ምስምዕምዐን ብቃል ይግለፃ፡፡ ብምቅፃል ሓበሬታ ንምስብሳብ ቃለ ማሕትት ብአከብቲ ሓበሬታ ክካይድ እዩ፡፡ሽመን ምንጋር አየድልን፡፡ መልስን ምስጥራዊ እዩ፡፡

ሓደግታት ወይ ድማ ምምቸቻው፡ አብዚ መፅናዕቲ ብምስታፈን ዘይምምቸቻው ክስመዐን ይክእል እዩ፡፡ብፍላይ 20 ደቂቃ ዝአክል ግዚ ክሻመይ ይክእል እዩ፡፡ ነገር ግን ፅንዓት ካብ ዝህቦ ጥቅሚ አንፃር ከም ትሳተፉ ተስፉ ንገብር፡፡ አብዚ መፅናዕቲ ብምስታፈን ሓደጋ የብሉን፡፡

ክፍሊት፡ አብዚ መፅናዕቲ ብምስታፈን ዝክፈል ክፍሊት የለን፡፡

ምስጥራዊነት፡ነዚ መፅናዕቲ ዝተአከበ ሓበሬታ ብምስጥር ዝተሓለወ እዩ፡፡ እቲ ዝእከብ ሓበሬታ አብ ፋይል እንትትሓዝ ሽመካ ምስኡ አይፀሓፍን፡፡ነገር ግን መለለይ ቁፅሪ ክግበረሉ እዩ፡፡ እቲ ሓበሬታ አብ ናይ ዋና መፅንዒ ፋይል ጥራሕ ተቐሊፉ ስለ ዝቅመጥ ማንም ሰብ ክረክቦ አይክእልን፡፡

መሰል ምቁራጽ አብ ከይዲ ቃለ መሕትት፡ አብዚ መፅናእቲ ናይዘይምስታፍ ሙሉእ መሰል አለወን፡፡ምምላስ ዘይደልይኦም ሕቶታት ናይ ዘይ ምምላስ መሰል አለወን፡፡ አብ ዝኮነ ግዜ ናይ ምቁራፅ መሰል አለወን፡፡

ብዛዕባ እቲ መፅናዕቲ ሓበሬታ ንምሕታት እንተደሊየን ምስ እዞም ዝስዕቡ ሰባት ክራከባ ይክእላ እየን፡፡

1. አቶ በሪሁ ግደይ ቁፅሪ ስልኪ 0923492776
2. አቶ ካሳሁን አለሙ ቁፅሪ ስልኪ 0911752466

3. ወ/ሮ አዜብ አጠናፉ ቁፅሪ ስልኪ 0918774536

ANNEX VII: ናይ ስምምዕነት ቅጥዒ ቅድመ መፅናዕቲ ሕቶን መልስን

ኣብ ላዕላይ ማይ ጨዉ ወረዳ ኣብ ዝርከባ ገዛዉቲ ተጠቃማይ አዮዲን ዘለዎ ጨውን ተዛመድቲ ጉዳያትን ኣብ መንነ ምግቢ ከዘጋጅዉ ዝክእላ ደቂ አነስቲዮ ብዝብል ስያሜ ኣብ ዝካየድ መፅናዕቲ ንምስታፍ ዝተሰማማዕኹ ኮይነ፣ ነዞም ዝስዕቡ ዋኒናት ኣብ ግምት ብምእታው እዩ።።

ዕላማ ናይዚ መፅናዕቲ ኣብ ላዕላይ ማይ ጨዉ ወረዳ ኣብ ዝርከባ ገዛዉቲ ተጠቃማይ አዮዲን ዘለዎ ጨውን ተዛመድቲ ጉዳያትን ንምፍታሽ ምኻኑ ብምርዳእ፣ እዚ ቃለ መሕትት ብድሌት ጥራሕ ዝግበርን ምሸጥሩ ዝተሓለወን ምኻኑ ብምእማን ከምኡ ውን ምስታፈይ፣ ዘይምስታፈይ ወይ ምንፃገይ ኣባይ ምንም ዓይነት ተፅዕኖ ከምዘይብሉ ኣብ ግምት ብምእታው፣ ኢሉ ውን ኣባይ ዘምፅአ ሳዕቤን ከምዘየለ ብምርዳእ፣ ኣብ መወዳእታ እውን ነዚ

መፅናዕቲ ዝምልከት ሕቶ እንተለኒ ወይ ድማ ናይዚ መፅናዕቲ ውፅኢት ክፈልጥ እንተደልየ ንበዓል ዋና እዚ መፅናዕቲ ኣቶ በሪሁ ግደይ ኣብ ላዕሊ ብዝተጠቀሰ ኣድራሻ ምጥያቐ ከምዝክእል ብምእማን ፤ ኣብዚ መፅናዕቲ ንምስታፍ ፍቃደኛ እየ።።

ፍቃደኛ እንድሕር ዘይኮይነን ናብ ዝቅፅል ተሓታታይ ይሕለፉ/ፉ

ዝተሐተተሉ ዕለት----------ዝተጀመረሉ ሰዓት----------ዝተወደአሉ ሰዓት----------

ናይ ሐታታይ ሽም---------- ፊርማ----------

ሽም ተቆፃፃሪ---------- ፊርማ----------

ውፅኢት ቃለ መሕትት

1. ዝተማልአ
2. ዝተነፀገ
3. ዘይተማለአ

ANNEX VIII-ትግርኛ ቃል-መሕትት

ኣብ ጎንደር ዩንቨርስቲ

ጎንደር ሕክምናን ጥዕና ሳይንስን ኮሌጅ

ምርምር ማዕከል ሓለዋ ጥዕና ሕብረተሰብ ክፍሊ ትምህርቲ ሁማን ኑትርሽን

ኣብ ላዕላይ ማይ ጨዉ ወረዳ ኣብ ዝርከባ ገዛዉቲ ተጠቃማይ አዮዲን ዘለዎ ጨዉን ተዛመድቲ ጉዳያትን

ንምፅናዕ ዝተዳለወ መሕትት

001. ኣድራሻ/ ቀበሌ----------

002. ቁፅሪ መሕትት----------

መዘኻኸሪ- ካብቶም ዝተውሃቡ መማረፅታት ሕረዩ፤ ካሊእ ሓሳብ እንተሃልዩ ኣብቲ ክፍቲ ቦታ ይፀሓፍ

ተ.ቁ		ሕቶ	መልሲ	ናብ ዝቕፅል ሕለፍ/ፊ
1	ማሕበራውን ስነ-ህዝባውን ኩነታት ዝምልከቱ ሕቶታተ			
101	ዕድመ	----------ዓመት		
102	ሃይማኖት	1. ኦርቶዶክስ 2. ሙስሊም 99.ካልእ, ይገለፅ ----------		
103	ብሄር	1. ትግራዋይ 2. አምሓራይ 99.ካልእ, ግለፅ/ፂ----------		
104	ኩነታት ሓዳር	1. ባዓልቲ ሓዳር 2. ዘይተመርዐወት 3. ዝተፋተሐት 4. በዓል ገዝአን ዝሞተን 5. ተፈላልዮም ዝነብሩ 99. ካልእ ይግለፃ----------		
105	ናይ ትምህርቲ ደረጃ	1. ምንባብን መፅሓፍን ዘይትክእል 2. ምንባብን መፅሓፍን ትክእል 3. ቀዳማይ ብርኪ (1-8ይ) 4. ካልኣይ ብረኪ (9-12)		

		5. ዲፕሎማ ወይ ካብኡ ንላዕሊ		
106	ናይ መራሒ ሰድራ ድረጃ ትምህረቲ?	1. ምንባብን መፅሓፍን ዘይትክእል 2. ምንባብን መፅሓፍን ትክእል 3. ቀዳማይ ብርኪ (1-8ይ) 4. ካልኣይ ብረኪ (9-12) 5. ዲፕሎማ ወይ ካብኡ ንላዕሊ		
107	ቀንዲ መተሓዳደሪ ስራሕ?	1.ሙሉእ እዋን ኣብ ገዛ 2. ሓረስታይ 3. ናይ መንግስቲ ሰራሕተኛ 4. ነጋዴ 5. መዓልታዊ ስራሕተኛ 99. ካልእ ይግለፅ----------		
108	በዝሒ ሰደራ ቤት ክንደይ እዩ	_____ብቑፅሪ		
109	ኣብ ገዛኺኹም እዞም ዝስዕቡ ኣለወኹም ዶ?			
	g. ራድዮ?	1. እወ 2. ኣይብልናን		
	h. ሞባይል?	1. እወ 2. ኣይብልናን		
	i. ዓራት ምስ ፍርናሹ/ መተርኣስ	1. እወ 2. ኣይብልናን		
	j. ናይ ባዕልትኹም ገዛ	1. እወ 2. ኣይብልናን		
	k. ወንበር	1. እወ 2. ኣይብልናን		
	l. ጠረጴዛ	1. እወ 2. ኣይብልናን		
110	ኣዕዞም ዝስዕቡ ኣንስላ ዘቤት ኣለዋኹም ዶ:			
	h. ላሕሚ	1. እወ 2. ኣይብልናን		
	i. ብዕራይ?	1. እወ 2. ኣይብልናን		
	j. ኣጣል?	1. እወ 2. ኣይብልናን		
	k. ኣባጊዕ?	1. እወ 2. ኣይብልናን		
	l. ኣድገ-በቅለ?	1. እወ 2. ኣይብልናን		
	m. ቆፎ ንህቢ?	1. እወ 2. ኣይብልናን		

	n. ደርሁ?	1. እወ 2. አይብልናን	
111	ማንም ናይ ቲ ስደራቤት እዞም ዘስዕቡ አለዉኩም ዶ	1. ሳይክል 2. ሞተር ሳይክል 3. ጋሪ 4. መኪና 99. ካልእ እንተሃልዩ ይገለፅ_____	
112	ባይታ(ምድሪቤት)ናይቲገዛእንታይ ይመስል(ብምዕዛብ)	1. መሬት/ሑፃ 2. ዒባ/ጭቃ 3. ሲሚንቶ 99.ካልእ እንተኮይኑ ይገለፅ_____	
113	ላዕሊኡ(roof) ናይቲ ገዛ እንታይ ይመስል (ብምዕዛብ)	1. ቆርቆሮ 2. ሰቐላ/ሳዕሪ/ህድሞ 4. ሲሚንቶ 99.ካልእ እንተኮይኑ ይገለፅ_____	
114	ግድግዳ ናይቲ ገዛ እንታይ ይመስል(ብምዕዛብ)	1. መንደቐ ብጭቃ 2. ዕንፀየቲብጭቃ 3. ሲሚንቶ 99.ካልእ እንተኮይኑ ይገለፅ_____	
115	በዝሒ መደቀሲ ክፍሊ	_____ብቑፅሪ	
116	መብሰሊ መግቢ/እንዳከሸነ?	1. ናይ ባዕሉ ዝተፈለየ ገዛ 2. ካብቲ ግዛ ወጻኢኮይኑ አብ ደገ 3.አብቲዝነብሩሉ ገዛ ውሽጢ ብሓደ 99.ካልእ እንተኮይኑ ይገለፅ_____	
117	ሽቓቐ አለኩም ዶ	1. እወ_____ 2. አይፋሉን	
118	ናይ ባዕልኹም መሬት አለኩም ዶ	1.እወ 2. አይፋሉን	

119	አብ ባንኪ/ዕቃርን ልቃሕን ገንዘብ ተዓቁሩ ዶ	1.እወ 2.ኣይፋሉን	

ክፍሊ ከልተ ኣዴታት አብ ኣጠቓቕማ ኣዮዲን ዘለዎ ጨው ዘለወን ኣፍልጦ ዝድህስሱ ሕቶታት			
201	ቅድሚ ሕዚ ስለ ሕፅረት ኣዮዲን ሰሚዐን ዶ ይፈልጣ/ትፈልጢ	1. ኣወ 2. ኣይፋሉን	ኣይፋለይን፣ ናብ ተ.ቁ 204 ይሕለፉ
202	ሕፅረት ኣዮዲን ኣብ ጥዕና ዘስዕቦ ጠንቂ ይፈልጣ ዶ	1. እወ 2. ኣይፋለይን	ኣይፋለይን፣ ናብ ተ.ቁ 204 ይሕለፉ
203	ንሕቶ ቑፅሪ 202 መልሰን/ኺ እወ እንተኮይኑ ሕፅረት ኣዮዲን ኣብ ጥዕና ወድ ሰብ ዘምፅኦ ጉድኣታት እንታይ እንታይ እዮም(ካብ ሓደ ንላዕሊ መልሲ ምምላስ ይከኣል)	1. ሕፈስ 2. ናይ ሰነ ኣእምሮ ምዝሕታል 3. ናይኣካላዊ ዕበየት ምትእጉጋል 3. ጥንሲ ምንፃል 4. ኣብ ትምህርቲ ቡቁዕ ዘይምካን 5. ኣይፈልጦን 99. ካልእ እንተኮይኑ ይግለፃ_____	
204	ቅድሚ ሕዚ ስለ ኣዮዲን ዘለዎ ጨው ሰሚዐን/ኺ ዶ ይፈልጣ/ትፈልጢ	1. ኣወ 2. ኣይፋሉን	ኣይፋለይን፣ ናብ ተ.ቁ 301 ይሕለፉ
205	ንሕቶ ቑፅሪ 204 መልሰን/ኺ እወ እንተኮይኑ እቱ ሓበሬታ ካበይ ረኪበንኦ ነይረን(ካብ ሓደ ንላዕሊ መልሲ ምምላስ ይከኣል)	1. ካብ ጥዕና በዓል ሞያ 2. ካብ ራድዮ 3. ካብ ቴሌቪዥን 4. ካብ መሓዛ/ዘመድ 99. ካልእ ይግለፃ-------	
206	ንሕቶ ቑፅሪ 204 መልሰን/ኺ እወ እንተኮይኑ ኣዮዲን ዘለዎ ጨው ምጥቃም ንምንታይ ይጠቅም	1. ካብ ሕማም ሕፈስ ንምክልካል 2. ሙሉእ ጥዕና ንክህልወና ይገብር 3. ሕፅረት ኣዮዲን ንምክልካል	

	ይብላ/ትብሊ (ካብ ሓደ ንላዕሊ መልሲ ምምላስ ይከአል)	4. ዝተስተካከለ ዕብየት ንክህልወና 5. ኣይፈልጦን 99. ካልእ ይግለፃ------	
207	አዮዲን ዘይብሉ ጨው ምምጋብ ጉድኣት አለዎ ዶ ይብላ/ትብሊ	1. እወ 2. ኣይፋለይን	ኣይፋለይን፣ ናብ ተ.ቁ 209ይሕለፉ
208	መልሰን አወ እንተኮይኑ አዮዲን ዘይብሉ ጨው እንተተመጊበና ጉድኣቱ እንታይ እዩ	1. ሕፈስ 2. ናይ ሰነ አእምሮ ምዝሕታል 3. አብህፃናት ዕብየት ምትእጉጋል 4. አብ ህፃናት ድንኪ የምፅእ 5. ኣይፈልጦን 99. ካልእ እንተ ኮይኑ ይግለፃ------	
209	ኩሉ ዓይነት ጨው አዮዲን አለዎ ዶ ይብላ/ትብሊ	1. እወ 2. ኣይፋለይን	
210	ናይ አዮዲን ዘለዎ ጨው አብቲ መትሓዚኡ አዮዲን ከም ዘለዎ ዝገልፅ አርማን ፅሑፍን ከም ዘለዎ ይፈልጣ ዶ?	1. እወ 2. ኣይፋለይን	
211	አዮዲን ዘለዎ ጨው ካብ አዮዲን ዘይብሉ ጨው ዝበለፀ ጥንቃቀ የድልዮ ዶ ይበላ/ትብሊ	1. እወ 2. ኣይፋለይን	ኣይፋለይን፣ ናብ ተ.ቁ 213ይሕለፉ
212	ንሕቶ ቑፅሪ 211 መልሰን/ኺ እወ እንተኮይኑ እነታይዓይነት ጥንቃቐ የድሊ ብዝርዝር ይግለፃ (ካብ ሓደ ንላዕሊ መልሲ ምምላስ ይከአል)?	1. ካብ ሓዊ አርሒቕካ ምቕማጥ 2. ካብ ራሕሲ/ርጥበት ምክልካል 3. ካብ ፀሓይ ብርሃን ምክልካል 99.ካልእ እንተ ኮይኑ ይገለፅ------	
213	አዮዲን ዘለዎ ጨው አብ ጥቓ ሓዊ ምቕማጥ ፀገም አለዎ ዶ ይብላ/ትብሊ	1. እወ 2. ኣይፋለይን	

215	ንምግብንት ዝጥቀምሉ አዮዲን ዘለዎ ጨው መኪደኒ ዘይበሉ መቅመጢ እንተቅሚጦምዎ ናይቲ አዮዲን ንጥረነገር ትሕዝቶ እንታይ ይኸውን ይብላ	1. ይቅንስ 2. ፀገም የብሉን 3. አይፈልጦን	
216	ጣዕሚ አዮዲን ዘለዎ ጨው ካብ ቶም ካልኦት ዓይነታት ጨው ዝተፈለየ እዩ ዶ ይብላ/ትበሊ	1.እወ 2. አይፋሉን	
ክፍሊ-ሰለሰተ ናይ አዴታት ልምዲ አተሓሕዛን አጠቓቕማን አዮዲን ዘለዎ ጨው አብ ብርኪ አባይቲ			
301	ንምግብነት ዝኦም ዝጥቀምሉ ጨው አይናይ ዓይነት እዩ?	1. ዝተዓሸገ አዮዲን ዘለዎ ጨው 2. ጋብላ ጨው 3 ጥረ ጨው)	መልሰን/ኺዝተዓሸገአዮዲን ዘለዎጨውእንተኾይኑሕቶ 303-312 ይመልሳ
302	አዮዲን ዘለዎ ጨው ዘይት ጥቀምሉ ምክንያት እንታይ እዩ	1. ክባር ስለ ዝኮነ 2. ብጣዕሚ ጨዋማ ስለ ዝኮነ 3. ስለ ዘየመርቅን 4. ብቀሊሉ ስለ ዘይርከብ 5. መሪር/መሚፅ ሰለ ዝኾነ 6.ጉድአቱን ጥቅሙን ሰለ ዘይፈለጥናዮ 99. ካልእ እንተኮይኑ ይገለፅ-------	ንቶም አዮዲን ዘለዎ ጨው ዘይጠቀሙጥራሕ ዝምልከት ሕቶ
303	አዮዲን ዘለዎ ጨዉ ምጥቃም ካብ ዝጅምሩ ክንደይ ዓመት ይኸውን	1. --------ዓመት 2. አይዝክሮን	
304	አዮዲን ዘለዎ ጨው ካበይ እዮም ዝረኽብዎ	1. አብ መንደር ዝርከብ ዱካን 2. ሱፐር ማርኬት 3. ዕዳጋ 99. ካልእ ይግለፁ----------	
	አዮዲን ዘለዎ ጨው ንምግዛእ	----------ደቂቓ	

305	ክንደይ ዝአክል ይጋዓዙ(ናብቲ ቦታ ንምበፃሕ ጥራሕ)		
306	ንምግቢ ዝጥቀምሉ ጨው ፀሓይ ተውቅዕዎ ዲኹም	1. እወ 2. ኣይፋሉን	
307	ንምግቢ ዝጥቀምሉ ጨው ርስሓት ንምውጋድ ኢሎም ይሓፅብዎ ዲዮም	1. እወ ንሓፅቦ 2. ኣይንሓፅቦን	
308	ንምግቢዝጥቀምሉጨው ዘቕምጥሉ ቦታ	1. ኣብ ደረቅ ቦታ 2. ራሕሲ ዘለዎ ቦታ 3. ሓዊ ኣብ ዘለዎ ከባቢ 99. ካልእ እንተኮይኑ ይግለፁ----------	
309	ንምግቢ ዝጥቀምሉ ጨው መቕመጢ ኣቕሓ መኪደን ኣለዎ ዶ የብሉን/ ይገብሩሉ ዶ	1. ኣለዎ 2. ኣይፋለይን	
310	ሓደ ግዘ ዝገዛእኹምዎ ጨው ንኽንደይ ዝአክል ትጥቀምሉ	----------ወርሒ	
311	ምግቢ ከበስል ከሎ እቲ ጨው መዓዝ እየን ዝገብርኦ	1. ኣብ መጀመርያ እቲ ምግቢ ምብሳል እንትጅምር 2. ኣብ ማእኹል እቲ ምግቢ ከበስል ከሎ 3. ኣብ መወደእታ እቲ ምግቢ ምስ በስለ ገና እንተይወረደ 4. እቲ ምግቢ በሲሉ ምስ ወረደ	
ክፍሊ-ኣርባዕተ - ኣብቲ ጨው ዘሎ ኣዮዲን ንምፈላይ ሙኮራ ምግባር			
401	ኣብ ገዛ ዘሎ ጨው ኣዮዲን ንጥረነገርምህላውን ዘይምህላውን ሙኮራ ምግባር	1. 0 ppm 2. <15ppm 3. ≥15ppm	

ሕቶይ ሰለ ዝወዳእኹ ንዝሃባኒ መልሲ ብጣዕሚ እየ ዘመስግን የቕንየለይ!!!

ANNEX IX-COLINEARITY DIAGNOSIS

Coefficients[a]

Model	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
Place of storage	.951	1.051
duration of storage	.916	1.092
Educational status	.613	1.631
knowledge score total categorized	.689	1.452
use cover for salt container	.945	1.058
Radio	.771	1.296
Age category	.759	1.318

a. Dependent Variable: Availability of adequately iodized salt